

(1.2) Solving Linear Equations

How to solve linear relations - using an equation
- using a graph

There is a difference between a linear relation and a linear equation. You can solve a problem involving a linear relation by solving its associated linear equation.

Linear Relation

Linear Equation

Jan 30-9:50 PM

Example 1: Shannon got an iPhone for Christmas!! She pays a \$50.00 flat fee per month and \$1.50 for each MB of data she downloads. If her budget only allows her to spend \$100 per month, how many MB of data can she download?

Algebraic Solution

She can afford to download 33.3 Mb per month.

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Algebraic Solution

$$\begin{aligned} \text{Cost} &= y \text{ (dep)} \\ \text{Data (Mb)} &= x \text{ (ind)} \\ y &= mx + b \\ y &= 1.50x + 50 \\ 100 &= 1.50x + 50 \\ 100 - 50 &= 1.50x \\ 50 &= 1.50x \\ \frac{50}{1.50} &= \frac{1.50x}{1.50} \\ 33.3 &= x \\ \text{She can afford to download 33.3 Mb per month.} \end{aligned}$$

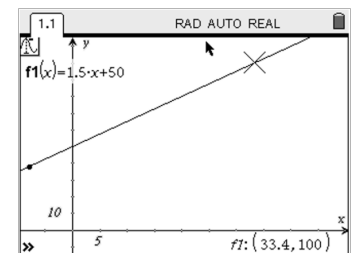
Jan 30-9:58 PM

Graphing Calculator Solution

Graph the linear relation _____.

Trace on the line to find the point that is closest to _____.

Interpolate



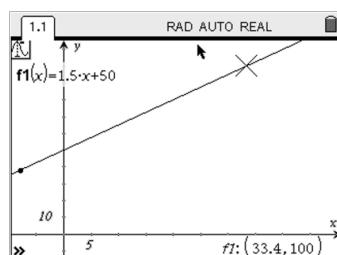
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Graphing Calculator Solution

Graph the linear relation $y = 1.50x + 50$

Trace on the line to find the point that is closest to $(33.3, 99.95)$.

Interpolate



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Example 2: The graph on the right shows the cost of renting a bus to take students on a biology trip to Toronto.

a) Label the axes

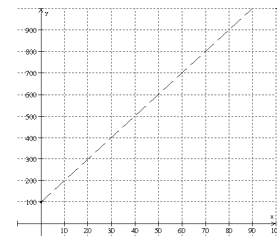
b) What is the cost if 30 students go on the trip?

c) What is the y-intercept of the line?

d) What is the slope of the line?

e) Determine the equation for the linear relation shown in the graph. Be sure to declare your variables.

f) Use your equation to determine how many students can go on the trip if it costs \$540 to rent the bus.



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Example 2: The graph on the right shows the cost of renting a bus to take students on a biology trip to Toronto.

a) Label the axes

b) What is the cost if 30 students go on the trip?
400

c) What is the y-intercept of the line?
+100

d) What is the slope of the line?
+10

e) Determine the equation for the linear relation shown in the graph. Be sure to declare your variables.
 $y = 10x + 100$
 $x = \# \text{ of students}$
 $y = \text{Cost}$

f) Use your equation to determine how many students can go on the trip if it costs \$540 to rent the bus.
 $540 = 10x + 100$
 $540 - 100 = 10x$
 $440 = 10x$
 $44 = x$

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PR2D Worksheet: Modeling with Linear Equations

Define the variables and write the equation. Do not solve.

The sum of two numbers is 72. Their difference is 48.

Alicia has a total of \$100 in \$2 and \$5 prize coupons. If she has 40 coupons in all, how many of each kind does she have?

Provincial Express charges \$4 plus \$0.50/kg to deliver a package overnight. The Package People charge \$5 per \$1/kg. When is Provincial Express less expensive to use?

Frank the high school hockey team 7 hours to travel to a tournament in Thunder Bay. They traveled by bus at 60 km/h and a total distance of 120 km. If the bus averaged 40 km/h and the plane averaged 300 km/h, determine the time they spent traveling by plane.

Two different kinds of coffee beans were blended. Individually, they cost \$2.30/kg and \$3.20/kg. How much of each kind was used if 200 kg of the resulting mixture cost \$2/kg?

Alicia has two part-time jobs delivering flyers. She earns \$9/h at her weekly job and \$12/h at her weekend job. Last week she worked 23 h and earned a total of \$233. How many hours did she work at each job?

The difference between two numbers is 45. Three times the larger number less five times the smaller number equals 75. Model this problem with a linear system.

Billy has \$8000 to invest and would like to earn \$500 from the money. How much should she invest in a bank that has been getting a 5% annual return and how much should she invest in a savings bank that pays 4% annual interest?

Feb 12-8:41 AM

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Example 3: A swimming pool is being filled at a rate of 25L/min. The pool can hold a maximum of 10000L. If there is 500L of water in the pool at 5:00 p.m. when will the pool be filled?

Save as a Challenge

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Example 3: A swimming pool is being filled at a rate of 25L/min. The pool can hold a maximum of 10000L. If there is 500L of water in the pool at 5:00 p.m. when will the pool be filled?

Rate of filling at 5:00 p.m.
 $10000 - 500 = 25x$
 $9500 = 25x$
 $380 = x$
It will take another 380 min

$\frac{380}{60} = 6.3 \text{ hrs}$
6 hrs
 $0.3 \times 60 = 20 \text{ min}$
5 p.m. + 6 h
11:20 p.m.

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Homework

P. 18-20 q. 1,2,4,5,7,8,10,11,& 13

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Worksheet

① $x + y = 72$ ① $x = \text{larger kg}$
 $x - y = 48$ ② $y = \text{smaller kg}$

$y = y_2$ - Simple Substitution

$x + y = 72$ ①
 $y = 72 - x$

$x - y = 48$ ②
 $x = 48 + y$
 $x - 48 = y_2$

$72 - x = x - 48$
 $72 = x + x - 48$
 $72 = 2x - 48$
 $72 + 48 = 2x$
 $120 = 2x$
 $\frac{120}{2} = \frac{2x}{2}$
 $60 = x$

$x + y = 72$ (60, 12)
 $60 + y = 72$
 $y = 72 - 60$
 $y = 12$

$x - y = 48$
 $60 - y = 48$
 $-y = 48 - 60$
 $-y = -12$
 $-1 - -1$
 $y = +12$

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⑤ $x + y = 200 \text{ kg}$ ①
 $2.30x + 3.20y = 600$ ②
 ($\approx 3/100 \times 200 \text{ kg}$)

$x + y = 200$
 $y = 200 - x$

$2.30x + 3.20(200 - x) = 600$ ②

$2.30x + 640 - 3.20x = 600$

$2.30x - 3.20x = 600 - 640$
 $-0.90x = -40$
 $\frac{-0.90}{-0.90} = \frac{-40}{-0.90}$
 $x = 44.4$

$x + y = 200$
 $44.4 + y = 200$
 $y = 200 - 44.4$
 $y = 155.6$

You make a mixture of 44.4 kg of cheap coffee and 155.6 kg of expensive coffee.

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Feb 13-2:07 PM

Attachments

TI-Nspire CAS Teacher Software.exe